



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

14

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/674,771	09/30/2003	Mark Visokay	TI-35943	4450
23494	7590	03/10/2005	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265			KENNEDY, JENNIFER M	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 03/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/674,771

Applicant(s)

VISOKAY ET AL.

Examiner

Jennifer M. Kennedy

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 December 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 29-33,35 and 37-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 29-33,35 and 37-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 29 and 35 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In line 4 of claim 29, Applicants recite "a second metal silicide". In line 8 of claim 29, Applicants recite "a second metal silicide". It is unclear in the claims whether the second metal silicide referred to on line 8 is the same metal silicide referred to on line 4. The examiner suggests replacing the second instance of "a second metal silicide" with "said second metal silicide".

In line 8 of claim 29, Applicants recite "a second metal silicide having a different composition". It is unclear which layer has a different composition from that of the second metal silicide. Is the second metal silicide different in composition from the first n-doped metal silicide, the second metal silicide, or the p-doped first metal silicide layer? The examiner suggests replacing in line 8, "a second metal silicide having a different composition" with --a second metal silicide having a different composition from that of the p-doped first metal silicide--.

Similarly, in line 4, the examiner suggests replacing "a second metal silicide having a different composition" with --a second metal silicide having a different composition from that of the n-doped first metal silicide--.

Furthermore, in claim 35, line 5, Applicants claim "a second metal silicide having a different composition". It is unclear which layer has a different composition from that of the second metal silicide. The examiner suggests replacing "a second metal silicide having a different composition" with --a second metal silicide having a different composition from the first composition--.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 29-31, 35, 38-39 are rejected under 35 U.S.C. 102(b) as being anticipated by Sayama et al. (U.S. Patent No. 5,744,845).

In re claim 29, Sayama et al. disclose a semiconductor device comprising:
an NMOS transistor gate structure (3, 36, 15a, 5a, and 7b), the NMOS gate structure comprising a gate dielectric (3) above a semiconductor body (1), an n-doped first metal silicide structure (36, 15a) having a first composition contacting the gate

Art Unit: 2812

dielectric, and a second metal silicide (5a) having a different composition above the n-doped first metal silicide; and

a PMOS transistor gate structure (3, 37, 15b, 5b, and 7a), the PMOS gate structure comprising a gate dielectric (3) above a semiconductor body (1), a p-doped first metal silicide structure (37, 15b) having a second composition contacting the gate dielectric, and a second metal silicide having a different composition above the p-doped first metal silicide.

Giving the claim its broadest reasonable interpretation, the first metal silicide structure can be considered the polysilicon layer and the silicide layer together (37, 15), and as such the silicide structure is in direct physical contact with the gate dielectric. Further, the examiner notes that the silicide layer (15) is electrically contacting the oxide layer.

In re claims 30 and 31, Sayama et al. discloses the device wherein the first metal silicide comprises a refractory metal, and wherein the refractory metal is one of molybdenum, tungsten, tantalum, and titanium (see column 7, lines 55-60).

In re claim 35, Sayama et al. disclose a transistor gate structure, comprising a gate dielectric (3) formed above a semiconductor body (1); a first metal silicide (15) contacting the gate dielectric, the first metal silicide doped with substantially single polarity impurities (see column 10, lines 49-57, and column 8, lines 60-65, and column 7, lines 50-55) and having a first composition; and a second metal silicide (5) above the first metal silicide.

Art Unit: 2812

Giving the claim its broadest reasonable interpretation, the first metal silicide structure can be considered the polysilicon layer and the silicide layer together (37, 15), and as such the silicide structure is in direct physical contact with the gate dielectric. Further, the examiner notes that the silicide layer (15) is electrically contacting the oxide layer.

In re claims 38 and 39, Sayama et al. disclose the device wherein the first metal silicide comprises a refractory metal, and wherein the refractory metal is one of molybdenum, tungsten, tantalum, and titanium (see column 7, lines 55-60).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 32 and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sayama et al. (U.S. Patent No. 5,744,845) in view of Bertrand et al. (U.S. Patent No. 6,432,817).

In re claims 32 and 40-41, Sayama et al. disclose the device as claimed and rejected above, including wherein the second metal silicide layer comprises tungsten, but does not disclose the device wherein the second metal silicide comprises nickel.

Art Unit: 2812

Bertrand et al. disclose the device wherein the second metal silicide comprises nickel (see column 5, lines 56-65). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the second metal silicide layer of Ni because as Bertrand et al. discloses Ni offers particular advantages over other metals in silicide technology, including that of the tungsten, such as a reduced thermal budget (see Bertrand et al., column 1, lines 57-60).

Claims 33 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sayama et al. (U.S. Patent No. 5,744,845) in view of Yu et al. (U.S. Patent No. 5,723,893).

Sayama et al. disclose the device as claimed and rejected above, but does not disclose the device in which a silicon layer is between the first and second metal silicides.

Yu et al. disclose the device in which a silicon layer (24) is between the first (26) and second (22) metal silicides. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a silicon layer between the first and second metal silicide layers, because as Yu et al. disclose, the device allows for good electrical conducting path for gate electrodes and interconnecting lines with low contact resistance even during overetching the gate electrode contact openings (see column 6, line 53 through column 7, line 10).

Response to Arguments

Applicant's arguments with respect to claims 29-33, 35, and 37-41 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bai et al. (U.S. Patent No. 6,204,103) disclose forming the silicide layer directly on the gate dielectric layer.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Art Unit: 2812

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (571) 272-1672. The examiner can normally be reached on Mon.-Fri. 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Jennifer M. Kennedy
Patent Examiner
Art Unit 2812

jmk